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GRAPHICAL REPRESENTATION OF GRADES OF HIGH-SCHOOL PUPILS

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A report made to a pupil that he has received a certain grade in a test does not vividly inform him just how he ranks with respect to his fellows or how his present mark compares with his records in preceding examinations. In order that a pupil may readily make the comparisons suggested, the Department of Mathematics in the University High School of the University of Chicago, designed a set of three cards upon which test grades may be graphically represented. The intention is to increase pride in accomplishment through friendly competition. Results of successive tests are posted in such a way that each pupil may compare his record with the records of his classmates, experiencing the satisfaction of standing near the top, or feeling keenly the need of greater effort in the future.

Figure 1 is known as the class graph. The size of the card, about sixteen by twenty inches, may vary, depending on the number of pupils and the number of tests to be recorded. The numbers at the top of the card give the percentages made on the different tests. The 60 line is the passing mark. The numbers at the left in Figure 1 denote the pupils' numbers in the Department of Mathematics. At the beginning of the year each pupil is given a number which appears in place of his name on all records posted or otherwise made public. This is done in order to spare the slower pupils the embarrassment of having their failures advertised. Other students who desire to compete openly with their classmates may disclose their numbers if they desire to do so. Thus the leaders of the class are usually not in doubt as to their keenest competitors.

The class graph is placed on the bulletin board. After each test the teacher draws upon it the lines which represent the grades.

The graph enables the teacher to view the work of the class as a whole. While the appearance of the card is sometimes very discouraging to the teacher, nevertheless, it inspires him to make an earnest effort to help more pupils over the dead line and to induce those already over to improve their standing.

A large number of boys are interested in athletics. To a boy, it is a source of intense joy to be able to outrun, outjump, outplay

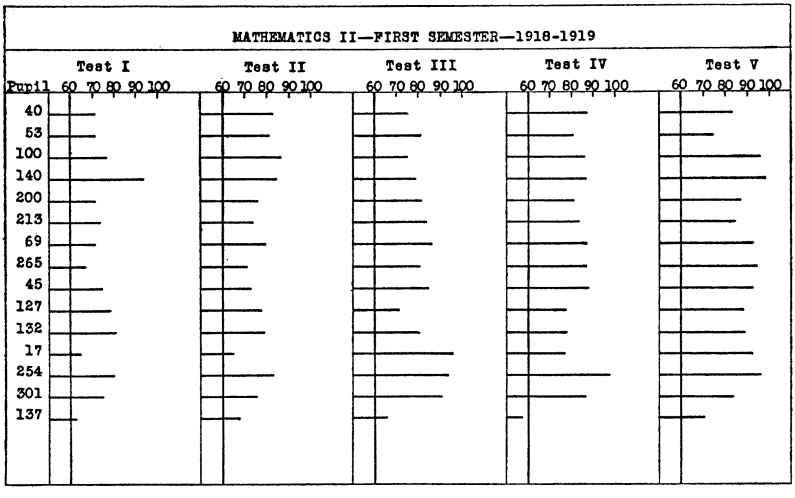

FIG. 1

his companions. The graphical representation (Fig. 1) can be easily compared to a hurdle race. The 70, 80, and 90 lines are hurdles which the pupil must clear before he can win the prize—the 100 line. If he fails to clear the hurdle represented by the 60 line, he has failed to place in the preliminaries and therefore is required to undergo extra training. As he is perfectly willing to give up some of his pleasures and to devote extra time to train for a field meet, so, if his standing in mathematics is presented to him as a sporting proposition, he will as freely make a more concentrated effort to prepare himself to excel in clearing the mathematical hurdles. Girls will try to show the boys that they can beat them at their own game.

The individual score card, four and one-half inches wide and ten inches long, gives graphically the entire history of the student's

grades in mathematics in all tests taken from the time he enters school until he leaves. Provision is made for fifteen tests per year for four years, and for the average grade made each year. The 60 line indicates the passing mark, and the 100 line the goal toward which the pupil is striving. The numbers at the left of each division give the number of any particular test. After each test a dot is placed in the proper column on the line that gives the number of the test. For example, if the student makes 85 per cent on the sixth test, a dot is placed six lines down on the 85 line. This dot is then connected with the dot that represents the grade made on the preceding test. Thus, at the end of the year, the card contains a graph which shows the nature of the student's work in mathematics for that year. The pupil is given one card for his own record, and the teacher keeps one for his files.

It was suggested by the pupils that they might use the four divisions on the mathematics card for records made in all the studies, for example, a separate graph of history, Latin, mathematics, and English. Figure 2 shows the mathematics card of one student used to represent his showing in four subjects for one semester. Each semester he may have another card to use in the same way. A card could readily be made providing space for grades less than 50 per cent so that a record could be kept of how seriously a pupil was failing.

Figure 3 shows the records of four pupils for one semester. Each represents a specific type of graph. A made 95 per cent on the first test and 100 per cent on each of the following tests. No computation is required to determine her grade for the semester. B made a low grade on the first test but improved her position on each succeeding test. C's record is erratic, showing a deviation of 31 per cent, possibly caused by sickness or by some other unavoidable reason. D made a very low grade on the first test and a lower one on each of the four following tests. While the writer was planning these cards, he drew D's graph and asked her to look at it. Immediately she declared that the graph must stay on the right side of the passing line. The result is shown by the mark on the sixth test, not a very high mark to be sure, but an improvement upon the others. The backward trend of the curve to the left

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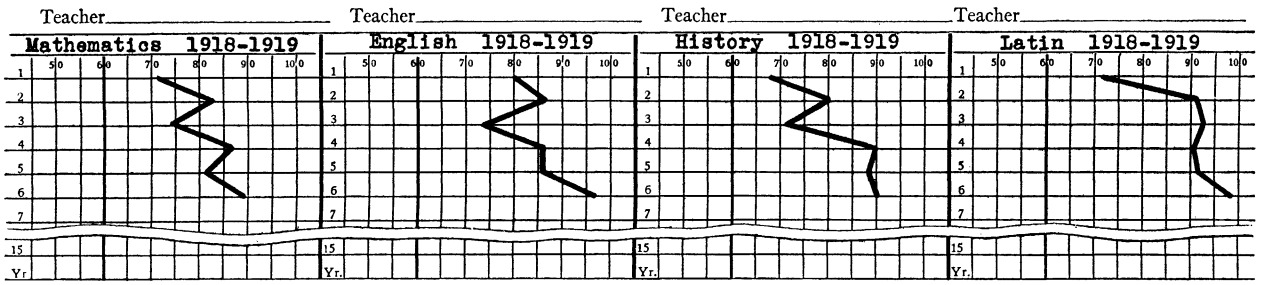

FIG. 2

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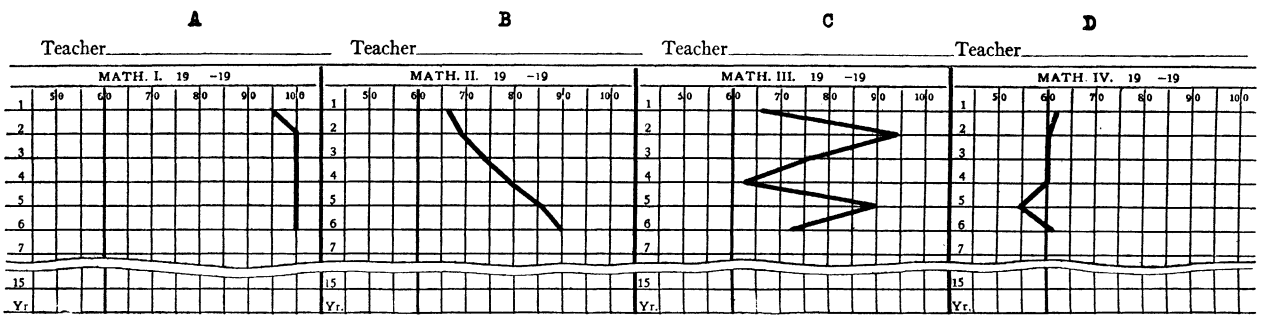

FIG. 3

of the passing line made an indelible impression on the pupil's mind.

By a glance at his individual card, the student can see whether he has improved his grade or has failed to measure up to his former record. One whose curve consistently approaches the 100 line will have great pleasure in proving to his parents or friends that he

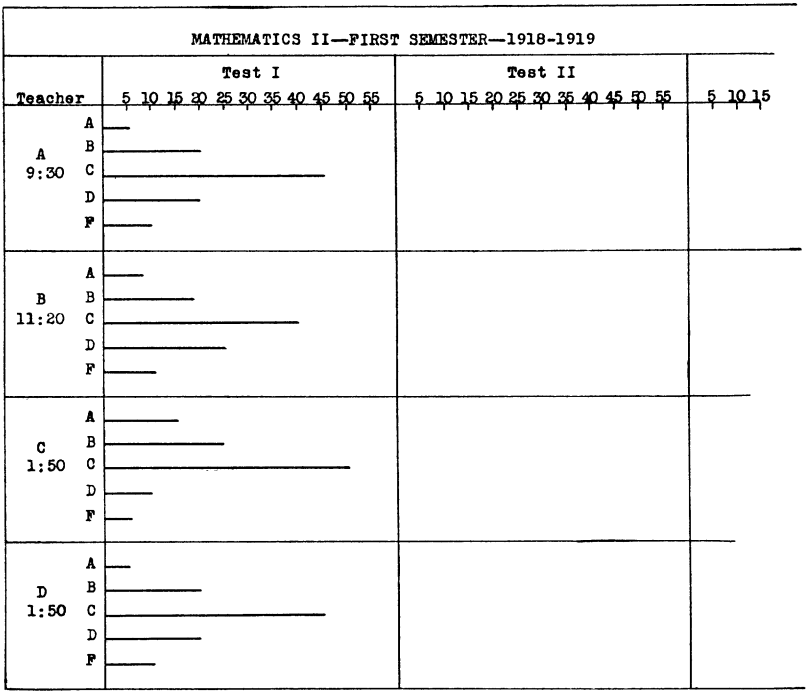

FIG. 4

is doing better work each time. The curve that constantly approaches the failing line will awaken in the owner the vital necessity of improving his work.

Figure 4 shows the percentage of A's, B's, etc. for each of four classes, taught by teachers A, B, C, and D, which had taken the same test. By studying this graph, teachers and pupils can compare their results with the results in other classes, a comparison which is valuable especially for teachers and school officials. Of course, such comparison of classes does not necessarily indicate the relative abilities of the teachers.